

FROM THE MAGAZINE RACK NO. 39
PAUL FRANCUCH

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ELECTRO-MEDICINE: NEW AID TO MEND BONES (EBONY)

BIG AND/OR LITTLE? SEARCH IS ON FOR RIGHT TECHNOLOGY (SMITHSONIAN)

MACHINE REVOLUTION: PROVIDING PRODUCTS WITH BRAINPOWER (BUSINESS WEEK)

ANNCR: HERE IS , WITH FROM THE MAGAZINE RACK, A REVIEW OF ARTICLES ON TIMELY TOPICS FROM MAGAZINES PUBLISHED IN THE UNITED STATES. TODAY, AN ARTICLE FROM BUSINESS WEEK ON HOW TINY SLICES OF SILICON MAY BE CHANGING THE WAY WE LIVE. FROM SMITHSONIAN A LOOK AT WHY SOME PEOPLE ARE THINKING "SMALL" IN AN AGE WHICH ENCOURAGES THINKING "BIG." AND FROM EBONY, NEWS OF A SUCCESSFUL NEW WAY TO MEND BONES WHICH DON'T WANT TO HEAL:

EDITOR: THERE'S NO DENYING THAT BROKEN BONES IN ARMS AND LEGS WILL BRING YOU WEEKS OF GROANS AND PAINS. BUT AFTER THOSE WEEKS OF BEING CAST IN INMOBILITY, THE FRACTURES HEAL AND YOUR BONES ARE AS GOOD AS NEW. AT LEAST FOR MOST PEOPLE THEY ARE. YET FOR ABOUT FIVE PERCENT OF PEOPLE HERE IN THE UNITED STATES WHO SUFFER FROM BROKEN "LONG" BONES -- THOSE IN THE ARMS AND LEGS -- THE FRACTURES DON'T HEAL. THE PATIENTS SUFFER FROM WHAT IS KNOWN IN MEDICAL CIRCLES AS "NONUNION" FRACTURES. BUT A NEW TECHNIQUE BEING PERFECTED AT THE UNIVERSITY OF PENNSYLVANIA'S SCHOOL OF MEDICINE IN PHILADELPHIA IS HAVING NOTABLE SUCCESS IN TREATING THIS UNUSUAL AILMENT.

EDITOR: IN THE CURRENT EDITION OF EBONY, MARTIN WESTON TAKES THE
(CONT) READER ON A TOUR OF THE PENNSYLVANIA FACILITIES WITH THE
GUIDANCE OF TWO "NONUNION" SPECIALISTS, DOCTORS ERIC
MITCHELL AND CARL BRIGHTON:

VOICE: "THE FIRST AND THIRD MONDAYS OF EACH MONTH ARE 'NONUNION
DAYS' AT THE ORTHOPEDIC CLINIC ON THE FOURTH FLOOR OF THE
UNIVERSITY HOSPITAL. THERE, AT A SOMETIMES FRANTIC PACE,
DR. MITCHELL ADMINISTERS TO MORE THAN A DOZEN PATIENTS
WHO HAVE ALL BUT ABANDONED HOPE THAT THEIR NONUNION
FRACTIONS WILL EVER HEAL. MOST HAVE BEEN IN CASTS FOR
YEARS -- AN AVERAGE OF THREE AND A HALF YEARS -- WHILE
THEY HAVE CONSULTED WITH VARIOUS SPECIALISTS, UNDERGONE
NUMEROUS OPERATIONS, AND HAD A CATALOGUE OF MEDICAL HARDWARE
IMPLANTED IN THEIR BODIES IN VAIN ATTEMPTS TO REUNITE
THEIR BROKEN LIMBS."

EDITOR: THE PENNSYLVANIA TEAM USES WHAT IS CALLED THE "SEMI-INVASIVE"
METHOD WHEREBY A LONG, PIN-LIKE CATHODE IS INSERTED THROUGH
THE SKIN, PENETRATING THE BONE IN THE AREA OF THE FRACTION.
USING A BATTERY PACK, ELECTRODE LEADS AND A STAINLESS STEEL
PLATE ANODE, AN ELECTRICAL FIELD IS BUILT AROUND THE
FRACTURE WHICH CAN BE WORN BY THE PATIENT. AFTER ABOUT
TWELVE WEEKS, MOST FRACTURES WILL HEAL ALMOST COMPLETELY.
WESTON NOTES, HOWEVER, THAT USING ELECTRICITY TO HEAL
FRACTURES IS NOT NEW:

VOICE: "DOCTORS HAVE KNOWN FOR ABOUT THIRTY YEARS THAT POSITIVE AND NEGATIVE ELECTRICAL CHARGES ARE PROPERTY OF BONE. MORE RECENT STUDIES BY DOCTOR BRIGHTON AND AN ASSOCIATE, DOCTOR Z.B. FRIEDENDERG, FOUND THAT SMALL AMOUNTS OF ELECTRICAL CURRENT ARE INVOLVED IN THE NATURAL REPAIR OF BROKEN BONE. THEY LEARNED THAT, IN THE NATURAL HEALING PROCESS, AN ELECTRICAL SIGNAL GOES OUT FROM THE BROKEN AREA AND DIRECTS CELLS TO FORM A NEW BONE. SOMETIMES, HOWEVER, PERHAPS BECAUSE OF POOR ALIGNMENT, EXCESSIVE MOVEMENT, INFECTION, OR A HOST OF OTHER REASONS, THESE ELECTRICAL SIGNALS STOP BEFORE THE HEALING IS COMPLETE."

EDITOR: DOCTORS MITCHELL AND BRIGHTON THINK THEIR "SEMI-INVASIVE" METHOD WORKS BECAUSE THE ELECTRICITY CHANGES THE AMOUNT OF OXYGEN AVAILABLE IN THE FRACTURE AREA, AND CAUSES OTHER CHANGES IN THE AREA OF THE FRACTURE WHICH HELPS BONE GROWTH.

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ELECTRICITY, WRITES MARTIN WESTON, IS FINDING USE IN HOSPITALS IN WAYS OTHER THAN LIGHTING LAMPS, RUNNING ELEVATORS, OR HEALING BROKEN BONES:

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"THE WORK BEING DONE BY DOCTORS BRIGHTON AND MITCHELL IS PART OF A RAPIDLY DEVELOPING FIELD OF MEDICINE -- ELECTROMEDICINE -- THAT IS PUTTING ELECTRICITY TO USE IN HEALING THE BODY WHERE MORE CONVENTIONAL APPROACHES HAVE FAILED. (FOR EXAMPLE,) DOCTORS ARE USING ELECTRICAL STIMULATION TO CORRECT CURVATURE OF THE SPINE, RELIEVE PAIN AND CONTROL EPILEPSY."

EDITOR: THE ELECTRIFYING SUCCESS OF THE TWO UNIVERSITY OF PENNSYLVANIA PHYSICIANS HAS NOT STOPPED THE CONTINUING CLINICAL TESTS TO ESTABLISH THE BEST TREATMENT FORMULA. EBONY'S ARTICLE CONCLUDES BY NOTING THAT CLINICS AROUND THE UNITED STATES WILL SOON BEGIN TESTING THE TREATMENT. IF THE PENNSYLVANIA RESULTS ARE DUPLICATED, THE PROCEDURE WILL PROBABLY GAIN COMPLETE OFFICIAL ACCEPTANCE.

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EDITOR: IN THE HIGHLY-AUTOMATED AND TECHNOLOGICAL SOCIETIES OF DEVELOPED COUNTRIES, ONE SELDOM THINKS OF THE INHERENT HAZARDS. THAT IS, NOT UNTIL NEWS STORIES FLASH WORD OF MASSIVE POWER FAILURES, OIL SPILLS FROM "SUPERTANKERS," AND FIRES OR MALFUNCTIONS AT NUCLEAR POWER PLANTS.

THIS IS AN AGE WHERE SUPERTECHNOLOGY IS KING. BUT IS IT ALWAYS APPROPRIATE TO PUT SUCH OVERWHELMING EMPHASIS ON MODERN, COMPLICATED GAGETRY? WILSON CLARK, WRITING IN SMITHSONIAN MAGAZINE, SAYS NO:

VOICE: "MODERN INDUSTRIAL SOCIETY IS CHARACTERIZED BY SYMBOLS OF GREATNESS AND SIZE. MAN'S IMPRINT ON THE EARTH'S SURFACE IS NO LONGER A NEW HANDCRAFTED SHRINES LIKE THE ANCIENT PYRAMIDS BUT A VAST NETWORK OF INDUSTRIES, HIGHWAYS, BUILDINGS. NOT ONLY DO OUR MODERN TECHNOLOGICAL MONUMENTS CONSUME AN EVER-INCREASING PORTION OF THE EARTH'S ENERGY AND MINERALS, BUT THEIR PROLIFERATION IS ACCELERATING THE RATE OF INTERNATIONAL ENVIRONMENTAL DESTRUCTION. A QUESTION ARISES: IS OUR TECHNOLOGY APPROPRIATE?"

EDITOR: CLARK ANSWERS HIS QUESTION BY SAYING "NOT ALWAYS" -- NEITHER FOR DEVELOPED NOR DEVELOPING COUNTRIES. CITING THE DEVELOPING COUNTRIES FIRST, WILSON QUOTES AFRICAN TECHNOLOGY SPECIALIST JI'OH OMO-FADAKA WHO BELIEVES THE KIND OF TECHNOLOGY NEEDED IS THAT WHICH "WILL PRODUCE ENOUGH FOOD TO FEED THE WHOLE OF THE POPULATION AND THAT WILL ABSORB THE LABOR. IN THIS TYPE OF DEVELOPMENT, AGRICULTURE SHOULD BE THE KEY FACTOR, NOT INDUSTRY."

THE INTERNATIONAL LABOR OFFICE IN GENEVA AGREES, AND A RECENT STUDY OF THEIRS SUGGESTS THAT MANY DEVELOPING COUNTRIES NEED A "SHIFT TO INDIGENOUS RAW MATERIALS, SMALL HAND-OPERATED MACHINERY AND THE USE OF VARIOUS WASTE MATERIALS FOR THE GENERATION OF ENERGY IN INDIVIDUAL INDUSTRIAL PLANTS."

BRITISH ECONOMIST E.F. SCHUMACHER SAYS DEVELOPING COUNTRIES SHOULD DEPEND ON WHAT HE CALLS "INTERMEDIATE TECHNOLOGY." THAT IS, TECHNOLOGY SUPERIOR TO PRIMITIVE METHODS OF BYGONE DAYS, YET MUCH SIMPLER AND CHEAPER THAN TODAY'S SUPERTECHNOLOGY. TEN YEARS AGO, MISTER SCHUMACHER FOUNDED A GROUP HEADQUARTERED IN LONDON CALLED THE INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP, OR I-T-D-G FOR SHORT. THEY PROVIDE TECHNOLOGICAL KNOW-HOW TO DEVELOPING COUNTRIES IN A VARIETY OF WAYS. CLARK CITES AN EXAMPLE:

VOICE: "AT THE REQUEST OF THE ZAMBIAN GOVERNMENT, THE ITDG DEVELOPED AN EGG-TRAY PRODUCTION MACHINE COSTING \$19,500, WHICH IS SCALED TO THE NEEDS OF THE COUNTRY. THE CHEAPEST

VOICE: (CONT) MACHINE AVAILABLE ON THE INTERNATIONAL MARKET WOULD HAVE COST \$390,000, AND WOULD PRODUCE A MILLION TRAYS A MONTH, FAR MORE THAN ZAMBIA NEEDED. THE SMALL MACHINE OFFERS MORE EMPLOYMENT OPPORTUNITIES AND LOWER CAPITAL INVESTMENT, AND CAN BE USED TO FABRICATE OTHER ITEMS THAN TRAYS."

EDITOR: HERE IN THE UNITED STATES, VITA, OR VOLUNTEERS IN TECHNICAL ASSISTANCE, OFFERS FREE TO DEVELOPING COUNTRIES THE CONSULTING SERVICES OF MORE THAN 6,000 SCIENTISTS AND ENGINEERS.

ONE OF THE PRIME FOCUSES OF ATTENTION FOR VITA, I-T-D-G AND OTHER SIMILAR ORGANIZATIONS IS FINDING WAYS TO PROVIDE CHEAP AND EFFICIENT ENERGY. RATHER THAN SPENDING VAST SUMS OF MONEY ON NUCLEAR POWER DEVELOPMENTS WHICH OFFER LIMITED IMMEDIATE VALUE FOR THE POPULATION AS A WHOLE, SCIENTISTS AND ENGINEERS FROM BOTH THE ORGANIZATIONS AND THE DEVELOPING COUNTRIES ARE WORKING ON PERFECTING THE USE OF WINDMILLS, SOLAR POWER, AND THE CONVERSION OF COW DUNG TO METHANE GAS.

WHAT KIND OF TECHNOLOGY IS APPROPRIATE TO DEVELOPED COUNTRIES, ESPECIALLY THE UNITED STATES, IS ANOTHER QUESTION THAT NEEDS ATTENTION. CLARK WRITES:

VOICE: "THE IDEA THAT EFFICIENCY INCREASES WITH SIZE HAS RARELY BEEN CHALLENGED, AND REMAINS A KEY CONCEPT IN ECONOMIC THEORY, YET SMALL BUSINESS AND ORGANIZATIONS ARE OFTEN AS EFFICIENT IN THEIR USE OF HUMAN AND PHYSICAL RESOURCES AS LARGE ENTERPRISES, IF NOT MORE SO ... BUT THE INERTIAL

VOICE: (CONT) MASS OF LARGE CAPITAL INVESTMENTS WORKS IN FAVOR OF LARGE ORGANIZATIONS IN OUR ECONOMY, AND GOVERNMENT SUBSIDIES AND LAWS TEND TO ENCOURAGE BIGNESS TO THE DETERIMENT OF SMALL BUSINESSES AND ORGANIZATIONS. EVEN GOVERNMENT FUNDING FOR DEVELOPMENT OF SMALL-SCALE ENERGY TECHNOLOGIES, NOTABLY SOLAR ENERGY, HAS FAVORED LARGE CORPORATIONS RATHER THAN SMALL RESEARCH GROUPS AND BUSINESS WHICH HAVE ALREADY DEVELOPED SYSTEMS FOR HOMES AND BUILDINGS."

EDITOR: IN CONCLUDING HIS SMITHSONIAN ARTICLE, HOWEVER, WILSON CLARK CITES BUDDING EFFORTS BY THE STATE OF CALIFORNIA AND THE FEDERAL GOVERNMENT TO FURTHER DEVELOPMENT OF SMALL SCALE TECHNOLOGY.

THERE CERTAINLY ARE NO PLANS TO CRUSH AUTOMATION, SEVER POWER-LINES OR PERFORM ANY SIMILAR ACT OF TECHNOLOGICAL DEFIANCE. YET IN THE VIEW OF WILSON CLARK -- AND MANY OTHERS -- A STRONG ARGUMENT CAN BE MADE TODAY FOR GREATER SELF-RELIANCE, AND A NEED FOR THINKING SMALL.

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EDITOR: WHAT ADDS, SUBTRACTS, MULTIPLIES, DIVIDES, COMPARES AND STORES NUMBERS, ALL AT THE SPEED OF LIGHT, AND YET COMES IN THE SIZE OF A TINY SILICON CHIP? THE ANSWER IS THE MICROPROCESSOR, OR AS IT'S KNOWN IN THE TRADE, THE "M-P-U."

BUSINESS WEEK MAGAZINE SAYS THAT THESE LITTLE SPECKS HAVE PUT MAN AT THE DAWN OF THE SECOND INDUSTRIAL REVOLUTION. THE MICROSPROCESSOR IS BEING USED IN A VARIETY OF ITEMS, NICKNAMED "SMART PRODUCTS." ALREADY ON THE MARKET ARE SMART SCALES, CALCULATORS, WATCHES, HOUSEHOLD APPLIANCES,

EDITOR: TEST INSTRUMENTS, AND GAMES FOR ENTERTAINMENT. SMART PRODUCTS CAN AID AIRLINE PILOTS AND MONITOR AND CONTROL AUTOMOBILE TRAFFIC. THEY CAN CONVERT THE ORAL INSTRUCTIONS OF A STOCK EXCHANGE BROKER INTO DIGITAL INFORMATION, AND THEY CAN DO THINGS WHICH HAVE YET TO BE THOUGHT OF.

BUSINESS WEEK PREDICTS:

VOICE: "A TIDAL WAVE OF SMART PRODUCTS SUCH AS THESE IS ON THE WAY. THEY WILL DRAMATICALLY CHANGE MARKETPLACE FOR CONSUMER, COMMERCIAL AND INDUSTRIAL PRODUCTS. THE COMPUTER-ON-A-CHIP, POWERING THE BRAINS OF SMART PRODUCTS, WILL SPAWN NEW INDUSTRIES AND THOUSANDS OF NEW COMPANIES. AND IN THE PROCESS IT WILL WIPE OUT SOME EXISTING COMPANIES AND EVEN SOME INDUSTRIES."

EDITOR: TWO YEARS AGO, FEW PEOPLE WOULD HAVE MADE SUCH A PREDICTION. BUT THE PRICE OF M-P-US HAVE DROPPED SO DRAMATICALLY THAT BUSINESS AND INDUSTRY SIMPLY CANNOT AFFORD NOT TO TAKE ADVANTAGE OF THEM. BUSINESS WEEK NOTES:

VOICE: "EVEN A YEAR AGO, THOSE \$20 MICROPROCESSORS COST MORE THAN \$100, AND THE SUDDEN SLASH IN PRICE LED DESIGNERS TO START WORK ON THE BEGINNINGS OF THE FLOOD OF SMART PRODUCTS. SWITCHING FROM THE CONVENTIONAL ELECTRONIC PARTS, SUCH AS INTEGRATED CIRCUITS, TO THE M-P-U CUTS DESIGN TIME AND MANUFACTURING COSTS BECAUSE IT REPLACES HUNDREDS OF INTEGRATED CIRCUITS AND OTHER PARTS. ONCE THE M-P-U IS DESIGNED INTO A PRODUCT, IT CAN PROVIDE TREMENDOUS MARKETING ADVANTAGES; A PRODUCT'S FUNCTION CAN BE ALTERED NOT BY A COSTLY REDESIGN OF ITS ELECTRONICS

VOICE: (CONT) BUT SIMPLY BY CHANGING THE INSTRUCTIONS, OR SOFTWARE, STORED IN THE M-P-U'S MEMORY. NEW FEATURES CAN BE ADDED WITH LITTLE INCREASE IN COST, AND THE NEW SMART MACHINES CAN HANDLE WORK THAT COULD NOT BE DONE ECONOMICALLY BEFORE."

EDITOR: THE MICROPROCESSOR HAS THOUSANDS OF POSSIBLE APPLICATIONS IN PLACES RANGING FROM THE SMALLEST BUSINESS TO THE LARGEST INDUSTRY:

VOICE: "THE BIGGEST SINGLE CUSTOMER FOR THE M-P-US WILL BE THE AUTO INDUSTRY, BUT EVEN THOUGH THE FIRST SMART CARS WILL ROLL OFF THE LINE THIS YEAR, IT WILL BE THE 1980S BEFORE USE IS WIDESPREAD. THE M-P-U'S JOB WILL BE SOLELY IN ENGINE CONTROLS AND NOT IN RUNNING GLAMOROUS NEW FEATURES SUCH AS DASHBOARD DISPLAYS. THIS IS BECAUSE IT IS GOVERNMENT LEGISLATION THAT IS PUSHING DETROIT INTO THE ELECTRONIC AGE."

EDITOR: BUSINESS WEEK QUOTES EXPERTS WHO SAY THERE ARE AN ESTIMATED 25,000 POTENTIAL APPLICATIONS FOR THE M-P-US, BUT ACTIVE DESIGNS ARE BEING PURSUED IN ONLY ABOUT TEN PERCENT OF THEM. HOWEVER, THINGS ARE JUST BEGINNING:

VOICE: "OVER THE NEXT SEVERAL YEARS, SMART PRODUCTS AND MACHINES WILL SPREAD AT AN EVER INCREASING RATE. SOFTWARE WILL BECOME AVAILABLE SO THAT ANYONE WILL BE ABLE TO PROGRAM A MICROCOMPUTER. SCHOOLS WILL BE TURNING OUT A FLOOD OF YOUNG PEOPLE FAMILIAR WITH MICROPROCESSORS AND EAGER TO BUILD PRODUCTS WITH THEM. THE SEMICONDUCTOR INDUSTRY WILL CONTINUE TO DEVELOP MORE POWERFUL PARTS."

EDITOR: BUSINESS WEEK CITES MANY EXAMPLES IN ITS ARTICLE OF HOW THE M-P-U WILL SOON BE CHANGING THE WAY WE LIVE, IN PRINCIPLE FOR THE GOOD OF MANKIND. BUT MY FELLOW EDITORS AND I WERE RELIEVED WHEN WE DIDN'T SEE ANY MENTION OF M-P-US REPLACING ... US ... US ... US ...

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ANNCR: YOU'VE BEEN LISTENING TO FROM THE MAGAZINE RACK, TIMELY TOPICS FROM PERIODICALS PUBLISHED IN THE UNITED STATES. JOIN US AGAIN NEXT _____, FOR SELECTIONS FROM THE MAGAZINE RACK. THIS IS _____.

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